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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/531,163	03/17/2000	Hiroyuki Yano	0039-7632-0X	5064

7590

06/21/2002

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EXAMINER

DEO, DUY VU

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 06/21/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

AS-91

**Office Action Summary**

Application No.

09/531,163

Applicant(s)

YANO ET AL.4

Examiner

DuyVu n Deo

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 May 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 44-60 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 44-60 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 20.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 44-47, 50, 54-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ronay (5,876,490).

Ronay teaches an slurry that is used for CMP containing polymer particles, inorganic particle, and water, wherein the polymer particles has charge different from the charge associated with the inorganic particle so that the polymer particles are highly attracted to the surface of the abrasive particles to form polymer-coated inorganic particles (claims a plurality of inorganic particles are attached to a surface of polymer particles (col. 3, line 40-43; col. 4, line 55-65). This would reads on claimed zeta potential of polymer particles are opposite as that of the inorganic and they are electrostatically bonded to form composite particles. Unlike claimed invention, Ronay doesn't describe the ratio of the mean particle size of the polymer and the abrasive particles is 1-40 or from 1.5-20. As described by Ronay, the polymer size is suggested to be in submicron particles (col. 7, line 65), which can be from 0.001-0.999 um and the abrasive particles are preferably at 0.075-0.1 um (col. 7, line 45). These ranges would includes the ratio within claimed ratio of 1-40 because submicron polymers at 0.999 um and abrasive particles at 0.1 would have a ratio of 9.99, which should be within claimed ratio of 1-40. Furthermore, the

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slurry would contain thousands of abrasive, particles which can be much smaller size than the polymers, and the amount of polymers are much smaller than the abrasive particles, 20 %wt of the abrasive particles in the slurry (col. 5, line 22), therefore in the slurry, a surface of the polymer would attached several abrasive particles.

The polymer particles have acidic groups poly(acrylic acid) (claimed carboxyl group and the anion) for the alumina abrasive or basic groups such as polymers with amino, amide, imide (claimed cation-formable nitrogen containing group and their cation) to coat silica particles. (col. 5, line 25-50). The slurry typically contain acidic oxidant (oxidizing agent) and further contains a dual-valent rare earth or suspension of its colloidal hydroxide, wherein the rare earth ion is in its higher valent form such as  $Ce^{4+}$ ,  $Pr^{4+}$  and  $Tb^{4+}$  (claimed polyvalent metal ion) (col. 7, line 5-40; col 65-col. 8, line 24).

In col. 5, lines 21-22, Ronay also teaches the ratio, of the content of the polymer particles to the abrasive particles, that would overlap claimed of 0.05-1 (col. 5, line 21-22). Therefore, it would have been obvious at the time of the invention for one skill in the art to determine the amount of the polymers and the particles through routine experimentation in order to form a composite of particles and polymer particles to polish wafer with an anticipation of an expected result. The slurry further comprises a surfactant, which is typically about 0.1-2 w% (col. 8, line 6-21).

3. Claims 58-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ronay and further in review of Hiroto (JP 152673).

Referring to claim 58, preparing the slurry by using ultrasonic treatment or high-pressure homogenizer is known to one skill in the art. Hiroto teaches using ultrasonic dispersion with stirring to prepare the slurry (ab.)

4. Claims 48, 49, 51-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ronay as applied to claims 44, 50, 62, 65 above, and further in view of Hosali et al (US 5,738,800) and Skrovan et al. (US 5,916,819).

Referring to the pH of the slurry, Ronay describes the pH for oxide polishing is in the alkaline pH regime (col. 6, line 32-33). Skrovan teaches that pH of the slurry would be depending on the type of the surface being polished such as oxide polishing having pH greater than 9 and metal polishing having pH of about 4 (col. 5, line 20-25). Furthermore, Hosali shows in col. 3, line 1-35 that the pH of the slurry is to be determined through test run. Therefore, it would have been obvious at the time of the invention for one skill in the art to determine the pH of the slurry through routine experimentation depending on the material being polished.

#### ***Response to Arguments***

5. Applicant's arguments filed 5/3/02 have been fully considered but they are not persuasive.

Referring to applicant's argument that Ronay describes an invention in which the polymer is attached to the inorganic particles, whereas the present application describes the inorganic abrasive is attached to the surface of the polymer, col. 3, line 44-45, Ronay describes the polymers are attached to the surface of the abrasive particles because it has a charge different from the ionic charge associating with the abrasive particles (col. 4, line 55-58). This would also

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means that the abrasive particles are attached to the polymers because the abrasive particles have different ionic charge associating with the polymers.

Referring to applicant's argument that Ronay doesn't describe the ratio of the mean particle size of the polymers to the mean particle size of the abrasive particles is from 1-40. As described by Ronay, the polymer size is suggested to be in submicron particles (col. 7, line 65), which can be from 0.001-0.999 um and the abrasive particles are preferably at 0.075-0.1 um (col. 7, line 45). These ranges would includes the ratio within claimed ratio of 1-40 because submicron polymers at 0.999 um and abrasive particles at 0.1 would have a ratio of 9.99, which should be within claimed ratio of 1-40. Furthermore, the slurry would contain thousands of abrasive, particles which can be much smaller size than the polymers, and the amount of polymers are much smaller than the abrasive particles, 20 %wt of the abrasive particles in the slurry (col. 5, line 22), therefore in the slurry, a surface of the polymer would attached several abrasive particles.

Referring to applicant's argument that Ronay teaches that the composite particles inhibit the polishing rate of the abrasive particles while the claimed composite particles can provide polishing rates that may be more than twice the polishing rates achievable using the abrasive alone. This is vague and found unpersuasive because, in the abstract, Ronay teaches that the polishing rate is reduced at recesses, while the abrasive particles maintain high polishing rates at elevations which leads to improved planarization, and applicant has not provide that claimed high polishing rate is at recesses, elevation, or both.

In response to applicant's argument that references do not suggest that such composite particles is favorable and may yield improved polishing rates or polishing performance in


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slurries. In the abstract of Ronay, he teaches that this composite particles reduced polishing rate at recesses, while maintain high polishing rates at elevations, and this leads to improved planarization. Aren't these effects same as improved polishing rates and polishing performance of the slurries?

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n Deo whose telephone number is 703-305-0515.

DVD

June 20, 2002

  
**BENJAMIN L. UTECH**  
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